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Twenty Years of Road Building Progress in the United States

By Thos. H. MacDonald, Chief U. S. Bureau of Public Roads.

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In the history of American road building there are two crucial periods which have influenced profoundly the subsequent development of the nation. Each marks a change in the attitude of the people toward highway transportation. In respect to the highway they are revolutionary changes - the first change from busy, throbbing life to partial desuetude, the second a renaissance. In their bearing upon the history of the country they are evolutionary in character - each representing an improvement in transportation in that there is involved a better adjustment of facilities to the needs of the people.

Viewed historically both are abrupt changes; both are introduced by the invention of a new kind of self-propelled vehicle. The first is ushered in by the steam locomotive. Almost, it is possible to name the day on which the change occurred - independence Day, 1829. For, certainly there were in the events of that day all the potentialities which changed the course of settlement and upbuilding of this young country from a gradual, intensive growth outward from the eastern settlements - slowly, almost painfully, securing and cultivating the western possessions mile by mile - to a swift conquest of a continent-wide empire through the distance - defying agency of the railroad. For on that fourth of July, in the city of Baltimore the cornerstone of what has since come to be

one of our great railroad systems was laid by Charles Carroll of Carrollton, the last surviving signer of the Declaration of Independence. It was a momentous act, and that it should occur on the anniversary of the greatest day in American history is one of those inspiring coincidences which, in the history of nations, seem the evidence of a divine plan, so altogether fitting are they. The fourth of July, 1829 was as truly an independence day as that first fourth of July in '76 and who shall say that its consequences were not of equal moment to the American people. In 1776 they threw off the fetters of an unjust king; in 1829 they broke the bonds which restrained their economic development and set in motion the locomotive wheels which, shuttling back and forth across this continent, were to weave the fabric of a mighty and homogeneous empire in the shortest time in history.

On that day when the country turned to the railroad the highway lost its significance as a major factor in the economic life of the nation. It rapidly fell back into a place of comparative unimportance, and as the railroad grew, the highway sank to a lower and still lower estate. Its maintenance was neglected. At its lowest level, which was reached as the railroad approached the zenith of its development in the early nineties, it was no more than a neighborhood path. Those who laboriously followed its sinuous up-and-down course over "thank-you-marms" and bowlders rarely encountered a stranger. They met their neighbors only with whom they joined in mutual commiseration for the hardships of the road. And the very roads that should have made communication easy became the barriers which confined to their homes the long winters through the hardy and hard-working farmers who had forgotten what a road might be.

The first stirring of new life was felt in the late eighties and the early nineties. The bicycle was responsible. It's devotees sought pleasure roads. They organized clubs of wheelmen and the century run became the evidence of cycling prowess. And well it might. A hundred miles by highway was a greater distance than any man had travelled in the eastern half of the country for more than a half century. In response to their demand, reinforced by the early motorists, the vanguard of whose army arrived in the late nineties, first one, then another and another of the States began to make preparation for the improvement of the roads; and certain pioneer commonwealths, recognizing that the roads were destined no longer to remain the locally restricted arteries of travel they had long been, created State highway departments to administer the work of improvement on a scale commensurate with the longer range of travel.

It is significant of the stagnant state of the road building art in the nineteenth century that when these State departments set out to improve the roads for the cyclists and the motorists they could build no other kind of road than that which John L. MacAdam had devised in the early years of the century. And not many years were required to convince them that that kind of road would not do at all. The automobiles destroyed them as fast as they were built and passengers and countryside were coated with dust in the process.

With the increasing skill and ingenuity resulting from their few years of new experience the highway builders went to work to devise a type of road that would withstand the destructive action of the motor vehicles, and soon their efforts were rewarded in a measure by the discovery

of crude methods of combining tars and asphalts with the stone roads. Popular resentment against expenditures of public funds for the accommodation of the few who in the early days were rich enough to own motor cars was overcome by the reduction in the price of the vehicles which rapidly brought them within the means of the many. As a result the road builders were permitted to improve the new discoveries in road building and go on beyond them to the development of other types. But whether the "good roads" movement could ever have developed into the solid industry it now is, had it not been for the development of the motor truck is open to question. Certain it is that without the freight-carrying motor vehicle there would not exist the strong economic justification of road improvement that there is now. And, as nearly as it is possible to determine it, this strongest of all the arguments for road improvement first made its appearance just twenty years ago.

Real Highway Progress Began in 1904

In 1904 only 411 motor trucks were manufactured in the United States. In the same year the automobiles were numbered by the tens of thousands. In twenty years these main, impelling causes of better roads have grown to two and fourteen millions, respectively. In the beginning the motor car, like its predecessor the bicycle was a pleasure vehicle only - a doubtful pleasure, perhaps. By perfection of its design the motorist has now been freed of the numerous troubles which beset the path of his forerunners, and the automobile is finding a place for itself as an instrument of business as well as pleasure. The recent traffic surveys made by the Bureau of Public Roads in a number of States show that fully one-third of passenger-car mileage is in the interest of some business pursuit, and

It is impossible not to foresee that this business usage will increase in importance. As for the motor truck - it has become a downright necessity. That both types of motor vehicle will become still more numerous, especially the motor trucks, is written large in the fundamental economic facts which justify them.

For while the highway and the horse and wagon were rightly abandoned for the railroad in 1829 in order that our forefathers might quickly and thinly spread their culture over the wide, untamed spaces of their new land, the very efficiency of the railroad in performing its task has now created a condition of dense cultivation which demands a return to the improved highway and the improved highway vehicle as a short-haul supplement to the long-haul railroads. The country which has been developed extensively through the agency of the railroads is now to be further developed intensively with the aid of the motor vehicle and the highway. We have built from the periphery inward. The broad axe alone is no longer sufficient for the heaving of our destiny. We are working in close quarters and we must resort to the fine-pointed chisel for the closer work. We have cultivated the center of the field to the limit; we must now begin to plow around the margins. Between the meshes of our railroad system there is land which the railroad can not economically serve. At the centers, where the railroads meet, great cities have sprung up, and their rapidly multiplying population makes transport demands on the immediate tributary area which the railroads, unaided, can not answer. The motor truck and the automobile with the improved road offer the logical solution. It is these fundamental economic conditions which inspire confidence that the improvement of roads and the manufacture of motor vehicles ~~must~~ continue at an undiminished rate for years to come.

The Condition of Roads in 1904.

But this was intended to be a retrospect, not a prophecy. What

of road-building progress in the last twenty years? Briefly the answer is that whatever progress is now evident has been made in that time.

A survey of highway conditions made by the Office of Public Roads in 1904

showed that there were then in the United States only 38,622 miles of road classified as macadam or stone roads. Roads classified as gravel surfaced amounted to 108,233 miles; and there were only 6,307 miles of other types of surfaced roads, among which were included 2,541 miles in California surfaced with oil-mixed earth; nearly 200 miles of brick, mainly in Ohio, West Virginia and Iowa; 3000 miles of sand-clay in the Southern States; and 800 miles of shell roads in the coastal States.

There were other miscellaneous types of improved roads such as 145 miles of plank in Oregon; 13 miles of bituminous macadam and 3 miles of asphalt in Ohio and the town of Tisbury, Mass., had 2 miles of road surfaced with a mixture of tar and sand. Of the total mileage of public roads then in existence, amounting to 2,151,570 miles, nearly two million miles were not improved with any kind of surfacing material and, by reason of the lack of necessary provisions for maintenance, it is safe to say that this mileage and much of the surfaced mileage also was in a state of disrepair such as today is scarcely imaginable."

In Michigan there were 69,296 miles of public roads, of which 6,777 were reported as surfaced with gravel and 249 with stone, making approximately 7000 miles of surfaced roads. However, as later reports showed, much of the mileage reported as surfaced with gravel really consisted merely of natural gravelly roads.

Prior to 1904 there were only 13 States which had created any kind of State agency for the supervision of road improvement, and the powers and duties of these departments were largely advisory in character. In the year 1904 two more States passed legislation creating State highway departments, to be followed in 1905 by five others, one of which was Michigan.

The total cash expenditure for road construction and maintenance by all States in 1904 was approximately \$59,000,000, of which only \$2,500,000 or about 4 per cent was spent by or under the supervision of the thirteen State highway departments then in existence, and more than four-fifths of the total State-controlled expenditure was made by the four States of Connecticut, Massachusetts, New Jersey and New York.

Owners of motor vehicles in a number of the States paid into the public treasuries a total of slightly more than \$33,000^(000?); but most of the States made no charge for the privilege of using the roads, and most of those which did, failed to devote the money thus raised to road improvement ends. The principle of charging the motorist in accordance with the use of the road or in proportion to the road wear for which he is responsible had not yet emerged; and indeed there was yet no justification for it because the motorist's use of the rural highways was still so limited, and the service afforded by the small mileage of well kept road was so small as neither to require nor to warrant a special road charge on the basis of automobile ownership. The motorists, like all other citizens, paid for the repair and building of roads when they paid their poll and property taxes. If they preferred, they might choose in some States to work out their poll taxes, in lieu of cash payment, at the rate of a dollar a day.

But all this is not to say that the users of the roads paid nothing at all for the special privilege of use. So far as the public treasuries were concerned, that was the fact; but the better roads in those days were maintained by turnpike companies, and one did not drive far without finding progress barred by a gate, where toll was demanded to pay the cost of the improvement - and no mean toll it was! Six of these turnpike companies, surviving until 1919 in Maryland and Virginia, levied tolls amounting to \$5.05 for an aggregate distance of 187.5 miles, which is equivalent to 2.7 cents a mile. No State has yet attempted to exact any such fee from those who use its roads. To do so by means of a gasoline tax it would be necessary to levy the tax at the rate of 36 cents a gallon!

Because of the lack of coordinating State agencies to give harmony to the efforts of the counties, and because of the meagerness of the means at the disposal of the local governing bodies there was scarcely anywhere a continuously improved section of highway long enough for an afternoon motor ride. Interstate travel was still a thing of the future and to drive by automobile across the continent from east to west or from north to south was unthinkable. Nowhere was there a plan for the harmonious development of a system of highways covering any considerable area.

Maryland's system, the first to be planned for a whole State, was still a vision which had appeared only to her future governor, the far-seeing Austin L. Crothers, and a dream it was to remain for four more years.

The adoption of Michigan's own system of trunk line roads was still nine years off, and the Federal-aid highway system was a conception so remote from the best thought of the day that more than a decade later it would still be entertained as a fanciful notion only.

The Federal Government's interest in road improvement was limited by the \$35,000 which, in 1904, it appropriated for the maintenance of the Office of Public Roads. The Office made the most of its pittance by using it to carry on experimental work; to train local road builders through the construction of object-lesson roads under the supervision of its own engineers, and to complete the highway engineering education of a small group of engineering school graduates each year to form the nucleus of the highway engineering profession in which, it constantly preached, should be lodged the responsibility for the technical direction of construction. From the time of its creation as the Office of Road Inquiry in 1893 it had unceasingly urged the organization of highway departments in all States.

Last Twenty Years a Period of Innovation

Such was the situation in 1904. The country was then just beginning the work which has occupied it continuously for the twenty years since. The improved roads of that time had been surfaced for horse-drawn traffic and because of the early ravages of the automobile it is safe to say that scarcely a single mile, with the exception of the small mileage of brick survived the ensuing five years. It is a reasonable presumption, therefore, that the now existing mileage of surfaced roads, conservatively estimated at 450,000 miles, is a product of the 20 years of effort since 1904. As for the higher types of construction, such as concrete, brick, bituminous concrete, sheet asphalt and bituminous macadam, not only have practically all of these roads been built in this 20-year period, but the very methods by which they are now constructed are also the product of this period.

Indeed, if one would characterize the period as a whole, it must be as a period of innovation in all things pertaining to the highways. At the beginning of it, roads were built, maintained, used, administered and financed as they had been for a hundred years before. In every particular in which the roads of 1924 differ from those of 1824, the difference is a development of the last 20 years. By deliberate experimentation and incidental observation new types have been developed to meet the new requirements of the motor vehicle; the design of these types has been constantly improved; machinery has been invented to cheapen cost and speed production; engineering control has become the rule rather than the exception; State highway departments have been created in every State and there has been a progressive transfer of more and more of the important road work to their supervision; the Federal Government has become an active participant; the traffic has doubled and redoubled every three or four years and has changed in character from the wholly local and purely agricultural to a movement which is largely interurban and is limited neither by county nor State borders. And with the change in the character of the traffic there has grown up a distinctly modern development in the financing of the cost of the highways, i. e., the users of the roads have been called upon to pay an increasing proportion of their cost.

State highway systems have been designated in every State, and the State highway departments, equipped at least with more than nominal authority, are consistently and perseveringly applying all available funds toward the completion of these main systems. To this policy the Federal Government has given its unqualified support by the creation of the Federal-aid highway

system made up, in the main, of the more important links of the several State systems. And the result of this selective improvement of main systems is everywhere becoming apparent in the growing mileage of continuously improved road.

Annual Construction Now Four Times As Great As In 1904.

Whereas the annual construction of surfaced roads up to 1904 and for several years after did not exceed 10,000 miles, practically all of which was improved with what are not called low-type surfaces, there are now surfaced each year more than 40,000 miles, much of which is improved with pavements of high type. The annual cash expenditure has increased from 59,000,000 in 1904 to almost a billion dollars in 1924; and the percentage of the expenditure made under the supervision of the State highway departments has grown from 4 per cent in 1904 to more than 40 per cent at the present time.

The development of a sense of responsibility for the maintenance of the highways is another of the concomitants of State highway department control, reinforced by the insistence of the Federal Government since the Federal-aid road act became a law in 1916. There is no doubt that the urgent need of increased improved mileage in the earlier years of our two decades of progress, and a too optimistic confidence in the durability of the roads built, were responsible for the failure to reserve a sufficient portion of the available revenue for maintenance purposes. What part of the investment made in these years was dissipated as a result, no one can say, but it was probably considerable. So far as the State highway departments have influence this serious defect of administration has now

been practically eliminated, and marked improvement in maintenance is noticeable even on the county roads.

The best evidence of the improvement that has been made in the state of the roads is found in the large numbers of vehicles which now are to be found using them. From my office window I look down upon the entrance of one of Washington's famous hotels. The automobiles that arrive at that entrance bear the license tags of every State in the Union. I have counted as many as twenty different State licenses in the course of an afternoon ride on the Maryland roads. The survey of highway transportation in Connecticut, made by the Bureau of Public Roads showed a net tonnage of commodities transported over the Connecticut highway system amounting to over a million tons in three months, and a portion of this tonnage was moved by highway more than 100 miles. Motor bus lines operate over practically every main road and provide a service as regular as that offered by the railroads. The daily delivery of milk to our large cities, formerly a service rendered solely by the railroads is rapidly being taken over by the highways. Already several cities receive practically the whole of their daily supply in that way. A similar change has taken place in the transportation of livestock from the areas immediately surrounding the stockyards; and the supplies of fresh vegetables and garden truck required daily by city consumers are now also delivered by truck instead of by railroad. The railroads, themselves, realizing the advantage of highway transportation as a supplementary service are resorting to the motor truck for the transportation of the short-haul, package freight which has for some time been handled at a loss over the rails.

One might go on enumerating instances of new and more extensive usage of the highways as evidence of the progress that has been made. The daily truck delivery service from the country to the city has been mentioned, but the similar service in the opposite direction, delivering bread, ice cream, fresh meat, canned goods, dry goods and other commodities originating or purchased in the city is of practically equal importance.

None of these things was possible twenty years ago. That they are now a part of our daily experience is the result largely of several ideas developed during the period since 1904, among which I would enumerate the following as the most important.

1. The classification of highways as interstate, State and local roads and assumption of responsibility for each class by the appropriate governmental body.
2. The creation of State highway departments to administer the construction and maintenance of the State roads.
3. The provision of adequate funds for construction and maintenance of State roads, and the control of such funds by the State highway department.
4. The assessment of the cost of road improvement upon the various classes benefited in proportion to the benefits received.
5. Adjustment of the type of surface construction to the traffic requirements.
6. Continuous maintenance of all roads constructed.

These are the important principles which have been responsible for the progress that has been made in the last 20 years. I know of no better

chart to guide our future progress. Wherever they have not been applied in the past it will be the part of wisdom to apply them in the future, for the accumulated experience of 20 years is back of them.